Executive Summary

Maryland's Tributary Strategy

2004 Tributary Strategy Executive Summary

Sept 2004

This executive summary describes the state's Tributary Strategies Program. This report highlights the three elements of Maryland's Tributary Strategy and the progress made towards achieving the actions agreed to in the 2000 Bay Agreement.

Building on previous efforts and accomplishments, the Chesapeake Bay Signatories, Maryland, Virginia, Pennsylvania, Washington, D.C., the U.S. Environmental Protection Agency and the Chesapeake Bay Commission signed a historic pact to restore the Chesapeake Bay in 2000. This *Chesapeake 2000 Agreement* outlines goals to restore the health of the Bay's living resources and to remove the Chesapeake and its tributaries from the federal list of impaired waters.

The *Chesapeake 2000 Agreement* is comprehensive and outlines 93 commitments detailing protection and restoration goals critical to the health of the Bay watershed. The agreement addresses goals in five major categories: Living Resources; Vital Habitats; Water Quality; Sound Land Use; and Stewardship and Community Engagement. The Agreement also calls for new water quality goals based on scientifically determined requirements to restore the Bay's living resources, and lays out a framework for restoration efforts to be reached by 2010, and then maintained.

The Bay-wide annual nutrient loading goals are 175 million pounds of nitrogen and 12.8 million pounds of phosphorous. Maryland's portion is 37.25 million lbs for nitrogen and 2.92 million lbs for phosphorous. Achieving these goals will require more than a 50% reduction of 1985 harmful nutrient run-off levels from all sources. Specific sediment reduction goals were not set at that time, however significant reductions in sediment laden run-off will be achieved as the strategy is implemented.

These goals are also caps, meaning once Maryland and other States achieve the necessary reductions, they must maintain that level in order to sustain improved water quality in the Bay. This state-wide Tributary Strategy was developed to achieve and maintain Maryland's nutrient reduction goals.

What is the Tributary Strategy & why do we need it?

ln Maryland and throughout the Bay, great strides in nutrient reduction were made between 1984 and 2000. Although Maryland came close to meeting our original nutrient reduction goals, with improved science and a greater understanding of the Bay and river systems we know now that we need to do more. The orginial nutrient reduction strategy only planned through the year 2000, and the restoration of the Bay was not achieved. Consequently, Maryland, along with our partners, has committed to develop a new Tributary Strategy that will achieve the nutrient reduction goals established in the *Chesapeake 2000 Agreement* and restore living resources in the Bay and its tributaries. This strategy includes basin specific nutrient and sediment control actions necessary to reduce nutrient pollution from every source, including agricultural fields, urban and suburban lands, and waste water treatment plants. These ten basin specific plans are referred to collectively as Maryland's Tributary Strategy or the Tributary Strategies.

Who are the Tributary Teams?

Maryland's 10 tributary teams play an important role on many fronts of the bay restoration efforts. Appointed by the Governor, the Teams meet monthly and are comprised of citizens, farmers, business, and local government volunteers. Primarily, the teams focus on developing and implementing the tributary strategies, including policy, restoration, outreach and education activities.

For more information call 1.877.620.8DNR x8711 or www.dnr.state.md.us/bay/tribstrat

How Was the Strategy Developed?

The Strategy, which includes all of Maryland's ten major tributary basins, was developed with extensive input from the Tributary Teams, local governments, scientists, and various stakeholder and citizen groups. The strategy was tailored to the individual needs and characteristics of each local tributary, and involved a series of more than 25 public meetings over a six month period to gather public input. Interested citizens, organizations and stakeholders commented on the process of strategy development, options to be included and the strategy implementation process. The strategy was then refined based on public input, scientific data, and local and state policies, laws and implementation issues. The Governor's Chesapeake Bay Cabinet made final revisions to the Strategy which was ultimately approved by the Governor. The resulting final strategy calls for actions above and beyond many existing local and state policies, laws and budgets.

What's included in Maryland's Tributary Strategy?

Together, the ten tributary strategies form one statewide Tributary Strategy. The process to develop the strategy provided the opportunity to comprehensively identify actions needed to achieve the nutrient reduction goals. As a result of this comprehensive process and in consideration of other commitments in the *Chesapeake 2000 Agreement*, the strategy also addresses such important issues such as habitat restoration, erosion control, growth management, agricultural land preservation and the protection of public water supply.

The Tributary Strategy identifies specific actions or practices to achieve measurable reductions in nutrients entering local waterways feeding to the Bay. This includes some established practices currently being implemented, as well as emerging practices with reduction efficiencies based on preliminary scientific study.

This executive summary outlines three elements of Maryland's Tributary Strategy: The Draft Strategy & Supporting Actions, Key Implementation Elements, and an Implementation Timeline.

Draft Strategy:

This section summarizes the specific actions included in the strategy to reduce nutrients. The Strategy is presented in three main source categories: urban; agricultural; and point source discharges. Also included is a discussion of atmospheric sources and the Baywide Air Reduction Strategy. The nutrient reductions and specific practices identified are found in the attached Tributary Strategies Summary Tables 1 & 2.

Urban Sources:

The urban strategy acknowledges that urban development, impervious surfaces and sprawl development have a profound influence on the quality of Maryland's waters. The strategy includes a plan to address these impacts through stormwater treatment of developed land, reduction of nitrogen from septic sources and a sound land use strategy.

Stormwater Strategy

- Urban/developed land, through stormwater runoff, contributed 16% of the nitrogen and 24% of the phosphorus to the Bay from Maryland in 2002.
- Urban contributions were reduced by 1% for nitrogen and 18% for phosphorus between 1985-2002. Full implementation of the urban strategy will reduce nitrogen runoff by 24% and phosphorus runoff by 42% from 1985 levels.
- To achieve this reduction general implementation goals have been established, however specific actions or practices utilized will be determined by local governments based on regional priorities, site conditions/limitations and available funding.

Stormwater Strategy Examples:

- 100% newly developed and redeveloped land will address stormwater management in accordance with Maryland's existing stormwater management regulatory requirements.
- All stormwater management practices for recently developed lands (1985 to 2002) shall be inspected and maintained in accordance with Maryland's existing stormwater management regulatory requirements, or upgraded/retrofitted to more effectively reduce nutrients and/or provide channel protection where deemed appropriate and as funding is available.
- Up to 40% of untreated developed land (e.g., developed pre-1985) will be retrofitted (e.g., construct new and/or modify existing stormwater management practices including nonstructural and structural designs, reducing impervious

Stormwater Strategy Examples Cont:

cover, reducing of runoff, pollution prevention measures, etc.) as funding is available.

√ *Retrofit goals will vary depending on localized impairments and required reduction goals. Street sweeping, storm drain system cleaning, canopy coverage to reduce impervious and other practices will be included in this strategy when improved monitoring and documentation to quantify the practice efficiencies are provided.*

- Educate and achieve the participation of 100% of all Maryland residents to reduce home fertilizer use.

Septic Strategy

- Septic System discharges contributed 6% of the nitrogen to the Bay from Maryland in 2002.
- A 34% reduction in nitrogen from septic systems will be necessary to achieve state-wide nitrogen reduction goals between 1985-2010.

Septic Strategy Examples:

- 100% of new septic systems installed beginning in 2005 will include enhanced denitrification technology, as funding is available and/or as required by regulatory action.
- 100% of all existing septic systems will need treatment or upgrades or documentation of improved nitrogen removal or be hooked up to an existing sanitary sewer system, as funding is available.

√ *Goals will vary depending on localized impairments, individual tributary strategies, and required reduction goals. Documentation of existing systems and/or enhanced regulatory requirements of treatment systems will be included as meeting this strategy when improved monitoring and documentation to quantify the practice efficiencies are provided.*

Growth Management Strategy & Examples:

Although Maryland will continue to experience growth, how this growth is managed will be critical to achieving and maintaining the nutrient gap. Implementation of this strategy requires full cooperation with local government planning agencies and will help Maryland with the challenging task of maintaining the nutrient and sediment reduction goals.

- There will be a 30% annual reduction in new development outside of the designated Priority Funding Areas (PFAs) by 2010 (based on 1990-2000 data).

Agricultural Strategy:

The Agricultural Strategy includes a plan to work with Maryland's farm community to implement a range of Best Management Practices (BMPs) on farmland across the watershed to reduce nutrient and sediment loads. These BMPs are conservation practices that accomplish water quality goals while balancing the needs of crop and livestock production. This new strategy has significantly expanded BMP options, including over 23 different practices that work to protect the soil and natural resources.

- Agriculture contributed 39% of the nitrogen and 43% of the phosphorus to the Bay in Maryland in 2002.
- Agricultural contributions were reduced by 31% for nitrogen and 41% for phosphorus between 1985-2002. Full implementation of the Agricultural Strategy will reduce nitrogen runoff by 64% and phosphorus runoff by an estimated 58% from 1985 levels.

Agricultural Strategy Examples:

- 600,000 acres of cover crops, 150,000 acres of small grain enhancement and 50,000 acres of alternative crops (warm season grasses) covering over 75% of row crop acres will be planted in Maryland.
- Between 2000 and 2002, about 10,100 acres of forest buffers were planted on agricultural land. The overall 2000-2010 goal for riparian reforestation on agricultural land is 22,033 acres.
- 57,352 acres of grass buffers will be created.
- Over 12,207 acres of wetlands will be created.
- 100% of all farms will implement nutrient management plans.
- Nutrient loads will also be reduced through increased manure transport. All excess manure will be either transported for land application out of the watershed or utilized by an alternative beneficial use.
- Developing agricultural technologies such as variable rate fertilizer application will be implemented on 300,000 acres.
- There will be increased implementation of conservation and animal waste management on rural horse operations.

Point Source Strategy:

Point Sources are sources attributed to a specific identifiable end of pipe "point". The vast majority of nutrient point source discharges are from wastewater treatment plants.

- Waste water treatment plants or point sources contributed 26% of the total nitrogen and 20% of the total phosphorus to the Bay from Maryland in 2002.
- Point source contributions were reduced by 52% for nitrogen and 66% for phosphorus between 1985-2002. Full implementation of the Governor's Enhanced Nutrient Removal (ENR) Strategy will reduce nitrogen by 69% and phosphorus by 69% from 1985 levels.

Point Source Strategy Examples:

- Enhanced Nutrient Removal strategy establishes nutrient removal goals for major wastewater treatment plants as an annual average concentration of 3mg/1 total nitrogen and 0.3mg/1 total phosphorus.
- An annual load cap on nitrogen at each major treatment plant is established based on a 4 mg/l annual average concentration and design flow.
- An annual load cap on phosphorus at each major treatment plant is established based on a .3 mg/l annual average concentration and design flow. Where lower phosphorus limits are in effect due to local water quality considerations, the lower limits will govern.
- If there are technical limitations at any one plant, the ENR Strategy allows for the allocation or trading of discharge reduction within a Tributary Strategy watershed in a manner that maximizes cost effectiveness without compromising environmental benefit.
- Minor treatment plant discharge flows are capped at design capacity or projected 2020 flow, which ever is less. The 2020 projected flows are based on the County growth rates provided by the Maryland Department of Planning.
- To obtain a nutrient allocation, new treatment facilities with no load allocation in the Strategy, will have to trade with a facility or facilities operating beneath their allocation or use spray irrigation under a nutrient management plan designed to avoid adding nutrient loads to the groundwater.
- This strategy assumes a full upgrade of Blue Plains Treatment Facility (to 4 mg/l TN annual average) requiring Virginia and Washington D.C. cooperation.

Air Reduction Strategy:

This strategy is developed and implemented by the Environmental Protection Agency, however, nutrient reductions from enhanced air emission controls will improve water quality in Maryland. The strategy assumes full implementation of existing Clean Air Act policies which could equal a 15% nitrogen reduction to the Bay from the air.

Air Reduction Strategy Examples:

- Enhanced emission standards on light duty vehicles
- Reduction of airborne nitrogen oxide by enhancing 22 State Implementation Plans for air quality during the high ground level ozone season (summer).
- Non-utility source reductions by 2007

Supporting Actions:

Habitat Restoration includes practices that create, improve, or enhance forest, wetlands, streams, and shorelines. In some cases, resource improvements such as implementation of riparian forest buffers can have the added benefit of filtering nutrients and sediments from adjacent lands. In addition to nutrient reduction benefits, resource improvement practices can create or enhance terrestrial and aquatic habitat. The habitat restoration strategy is integrated throughout the tributary strategy and outlines the statewide goals for specific habitat types. The Strategy reflects Maryland's commitments to meet the *Chesapeake 2000* habitat goals.

Key Implementation Elements:

Stewardship and Community Engagement:

The Maryland Tributary Teams play a significant role in coordinating Bay restoration efforts at the local level, as they continually strive to engage the public, and work with local partners to raise the awareness of the Tributary Strategy process at the local level. In keeping with these ongoing efforts, the Tributary Teams will develop a stewardship and community engagement plan to be incorporated as part of each Team's annual work plan. The plan will include an evaluation of existing efforts, and identification of target audiences and key activities to assure the Tributary Teams are most effective in each basin. Beyond this, continued public education of the value of a restored Bay is critical to the implementation of the Tributary Strategy.

Funding the Strategy:

Meeting the water quality goals and implementing the Tributary Strategies will ultimately depend on having the necessary funds to pay for the best management practices that will achieve the nutrient load reductions. Through such efforts as the Chesapeake Restoration Fund, Governor Ehrlich has shown a strong commitment to meeting the goals of the *Chesapeake 2000 Agreement* and the Tributary Strategy. However, it is widely acknowledged that more resources are needed. To assist the Bay States, the Executive Council of the Chesapeake Bay Program has created a Blue Ribbon Financing Panel whose mission is to consider funding sources to implement the Tributary Strategies basin wide and make recommendations regarding actions needed at the Federal, State and local levels. The Blue Ribbon Panel recommendations will be incorporated in Maryland's strategy implementation plan and will help identify new opportunities for funding and define key program and policy changes needed to fund the Tributary Strategy.

The first step in this process was to develop a statewide Tributary Strategy cost analysis. This analysis included cost estimates, projected available funds and projected funding shortfalls for 2003 through 2010 for each of the practices in the Strategy. The estimated costs were developed by many public and private institutions and compiled by the state agencies and are included in Tables 2 & 3.

Clean Water Act Requirements & Other Watershed Planning Efforts:

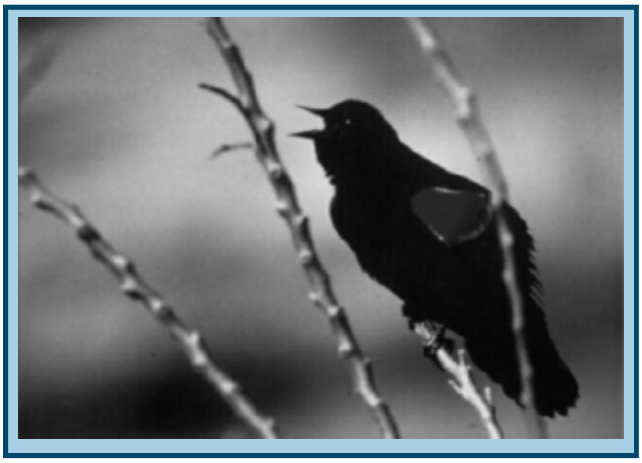
The Total Maximum Daily Load (TMDL) nutrient loading caps, a Clean Water Act requirement, are analogous to the Tributary basin cap, except that they are regulatory based and established at a smaller geographic scale to protect water quality standards of local waterbodies. Whereas the Tributary Strategy goals are based on the needs of the bay's resources, TMDLs are based on existing water quality standards. Consequently, the local TMDL loading caps are not always the same as the nutrient loading reduction goals for the Bay. However, Maryland's Tributary Strategy's broad implementation goals for specific nutrient reduction best management practices (BMPs) will provide a basis to target BMP implementation on a small watershed level in a way that meets both the localized nutrient TMDLs and the Bay nutrient goals. The TMDL allocation or caps for these small watersheds are developed by the Maryland Department of the Environment and approved by the Environmental Protection Agency. These local implementation plans will be developed through a stakeholder process, involving the Tributary Teams and others.

The Tributary Strategy process will also work in concert with other local watershed planning efforts. In order to address local issues, the Tributary Strategy will provide an initial plan for the ten larger basins, followed by smaller watershed plans nested within the larger basin. These sub-watershed plans will address the local water resource issues and can help meet not only the localized TMDL goals, but other *Chesapeake 2000 Agreement* goals. Land use and watershed planning at the local level will not only be essential to achieving but maintaining the nutrient reduction goals in the face of continued growth and development.

Tracking Our Progress:

The ultimate measure in the implementation of the Tributary Strategy will be restoration of the Bay's living resources. This will be monitored through both local and Chesapeake Bay water quality and resource response. Existing monitoring programs will continue to further assess the ecosystem benefits of watershed management and nutrient reduction actions. In addition to monitoring, the implementation progress will be tracked utilizing existing and new reporting mechanisms.

This process will continue to evolve, expanding its scope and improving its accuracy. This includes better reporting of specific best management practices as well as estimating the benefits associated with those actions. Improved tracking along with field based monitoring data will provide a comprehensive measurement of progress towards meeting the *Chesapeake 2000* water quality and living resource goals.



Developing an Implementation Plan:

This Tributary Strategy includes a formidable set of goals and calls for actions above and beyond current programs and policies. However, these goals are based on the needs for the Bay's living resources to thrive. To implement this strategy, extensive coordination and participation is needed at all levels of government, as well as by citizens of the State of Maryland. Extensive technical and financial support will also be needed to fully implement the range of actions that are critical to meeting the nutrient goals.

Following the adoption of the Strategy by the Governor's Bay Cabinet in Spring 2004, the State, together with the Tributary Teams, will undertake a thorough public input process to seek specific policy recommendations. This will include stakeholder focus groups, and input from local elected officials, the Tributary Teams and the public. Stakeholders will provide input on detailed implementation plans including possible ways to close the funding gap, actions needed to implement the strategies and who is accountable. This implementation strategy will be developed by the end of 2004.

Implementation Plan Timeline:

May – July 2004: Conduct stakeholder forums to generate program and policy recommendations needed to implement the strategy. Brief local elected officials on the strategies and solicit their feedback on implementation priorities.

July – September 2004: Compile tributary basin specific recommendations (Federal, State or Local Government, NGO's, general public, etc.). Review by Tributary Teams and stakeholder groups as necessary.

September – December 2004: Review draft recommendations by stakeholder groups and Tributary Teams for finalization and presentation to the Governor.

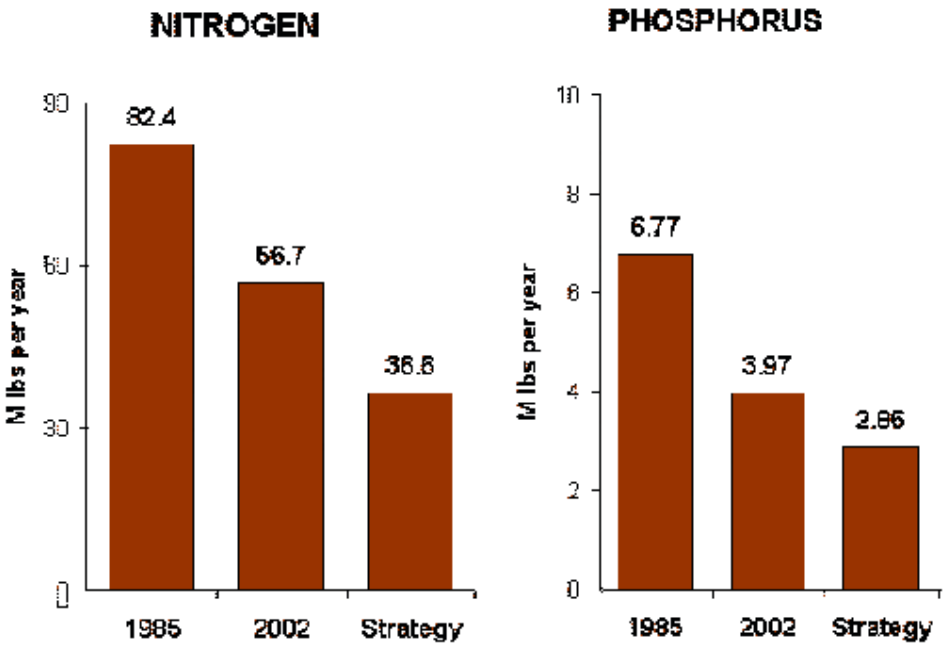
The result of this process will be a blueprint for implementation of Maryland's Tributary Strategy and the beginning of a long and hard process of not only restoring, but maintaining the health of the Bay and its tributaries. Some examples of program and policy recommendations that will be included at that time are below

- √ Identify adequate funding to achieve accelerated levels of implementation of agricultural BMPs.
- √ Establish dedicated funding sources, such as the Chesapeake Bay Restoration Fund to implement ENR at the 66 largest wastewater treatment plants in Maryland.
- √ Develop dedicated funding source (e.g., "System of Charges," "Stormwater Utility," or incentive based impervious surface fee) to support retrofitting existing developed areas and upgrade existing stormwater management BMPs.

Table 1

Maryland's Tributary Strategy

	NITROGEN (million pounds per year)			PHOSPHORUS (million pounds per year)		
Category	1985	2002	Strategy	1985	2002	Strategy
Agriculture	32.14	22.14	11.57	2.74	1.70	1.11
Resource Land	7.11	7.26	6.48	0.50	0.52	0.35
Urban Point Source	31.38	14.96	9.82	2.38	0.80	0.73
Urban Nonpoint Source	11.80	12.38	8.73	1.15	0.95	0.66
Septic	2.77	3.42	1.83	0.00	0.00	0.00
Stormwater	9.03	8.97	6.90	1.15	0.95	0.66
Grand Total	**82.43**	**56.74**	**36.59**	**6.77**	**3.97**	**2.86**
	Goal: 37.25			Goal: 2.92		



NOTE: April 26, 2004, Strategy 6, includes 222,316 lbs/yr TN and 145,980 lb/yr TP reductions from Shore Erosion Control practices, subtracted from Mixed Open loads, and 300,000 lbs/yr TN reduction from Point Source loads.

Table 2

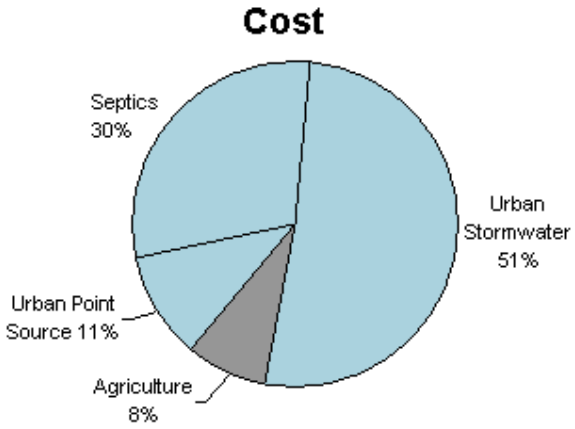
Maryland's Tributary Strategy Best Management Practices

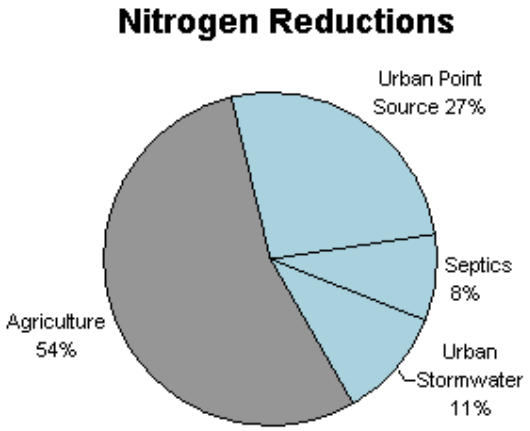
		Full Strategy 1985-2010	Remaining Strategy 2003-2010	
Best Management Practices	**Units**	**Units**	**Units**	**Costs (M$$)**
Agriculture				
Soil Conservation & Water Quality Plans	acres	1,364,718	578,630	$202.5
Conservation Tillage	acres/yr	720,216	718,037	$97.7
Cover Crops, Early	acres/yr	600,000	600,000	$192.0
Commodity Cover Crops, Early	acres/yr	150,000	150,000	$24.0
Alternative Crops	acres/yr	50,000	50,000	$10.0
Animal Waste Management - Livestock	systems	2,023	1,016	$64.5
Animal Waste Management - Poultry	systems	1,247	213	$5.7
Runoff Control	systems	1,092	424	$3.0
Nutrient Management	acres	1,364,718	1,364,718	$13.8
Precision Agriculture	acres	300,000	300,000	$33.6
Stream Protection With Fencing	acres	11,505	10,155	$10.2
Stream Protection Without Fencing	acres	29,748	3,448	$2.3
Retirement of Highly Erodible Land	acres	28,922	26,329	$3.6
Buffers Forested - Agriculture	acres	32,506	19,130	$21.8
Buffers Grassed - Agriculture	acres	60,764	57,352	$9.1
Tree Planting - Agriculture	acres	10,712	4,310	$3.0
Wetland - Agriculture	acres	16,678	12,207	$48.6
Horse Pasture Management	systems	7,040	7,040	$30.4
Alternative Manure Management	tons	70,000	70,000	$11.2
Ammonia Emmissions	systems	740	740	$9.6
Phytase Feed Additive	percent	32	16	$8.0
Oyster Aquaculture	trays	12,080	12,080	$1.5
Urban				
Stormwater Management, New	acres	74,495	74,495	$260.7
Stormwater Management, Recent	acres	192,539	117,844	$412.5
Stormwater Management, Old	acres	337,711	337,711	$1,182.0
Stormwater Management, O&M	acres	604,745	66,256	$324.7
Erosion and Sediment Control	acres/yr	60,935	60,935	$2,827.4
Nutrient Management, Urban	acres	737,342	737,342	$12.2
Nutrient Management, Mixed	acres	727,823	727,823	$12.0
Buffers Forested, Urban	acres	1,375	1,038	$1.2
Tree Planting, Mixed Open	acres	5,195	2,043	$8.9
Tree Planting, Urban Pervious	acres	10,390	10,390	$45.3
Stream Restoration, Urban	linear feet	368,679	285,211	$63.9
Sprawl Reduction & Septics				
Sprawl Reduction	acres	21,527	21,527	$0.0
Enhanced Septic Denitrification	systems	347,897	347,897	$2,609.2
Enhanced Septic Denitrification O&M	systems	347,897	43,487	$365.3
Septic Connections	connections	14,047	3,068	$53.7
Point Sources				
WWTPs	BNR, ENR, plus 300,000 lbs/yr TN			$1,069.4
Shore Erosion Control				
Structural & Nonstructural, State	222,316 lbs/yr TN, 145,979 lb/yr TP			$0.0
Total Cost of Implementing Maryland's Tributary Strategy (Million $):				**$10,054.5**

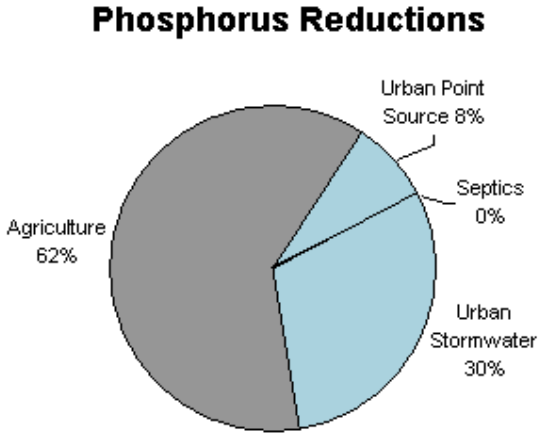
Table 3

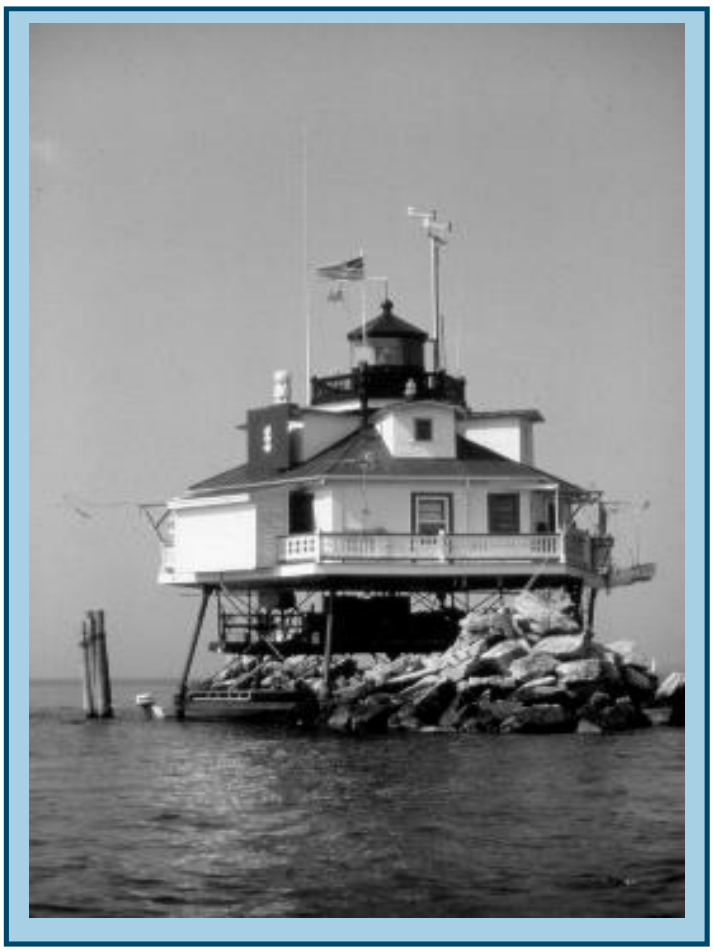
Maryland's Tributary Strategy Summary Funding Analysis

	Total Cost	Nitrogen Reductions	Phosphorus Reductions
	Million $	Million lb/yr	
Agriculture	$806	10.57	0.59
Urban Point Source	$1,069	5.14	0.07
Urban Nonpoint Source	$8,179	3.65	0.28
Septics	$3,028	1.58	0.00
Stormwater	$5,151	2.07	0.28
TOTAL	$10,054	19.36	0.95









State of Maryland

Robert L. Ehrlich, Jr., Governor
Michael S. Steele, Lt. Governor

Governor's Bay Cabinet

Dr. Donald F. Boesch, President
University of Maryland Center for Environmental Science

Robert L. Flanagan, Secretary
Maryland Department of Transportation

C. Ronald Franks
Maryland Department of Natural Resources

Dr. Bruce Gardner, Interim Dean
University of Maryland, College of Agricultural and Natural Resources

Aris Melissaratos, Secretary
Maryland Department of Business & Economic Development

Edward Miller, Deputy Chief of Staff
Office of the Governor

Kendl Philbrick, Secretary
Maryland Department of the Environment

Lewis R. Riley, Secretary
Maryland Department of Agriculture

Boyd Rutherford, Secretary
Department of General Services

Audrey Scott, Secretary
Maryland Department of Planning

Contact Us:
Watershed Services Unit
580 Taylor Avenue
Annapolis, Maryland 21401
www.dnr.maryland.gov
410-260-8710

Toll free number: 1(877) 620-8DNR x8711

This project was funded in part by the U.S. EPA Chesapeake Bay Implementaion Grant. Although this project is funded in part by the Environmental Protection Agency, it does not necessarily reflect the opinion or position of the EPA.